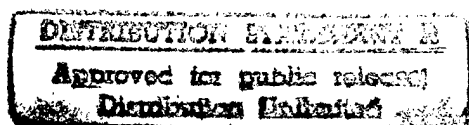


EXEC. SUM.
INCR. G of
BWES
CAMERON STATION
ALEXANDRIA, VA.



19971023 117

EX-100-000000-000000-0



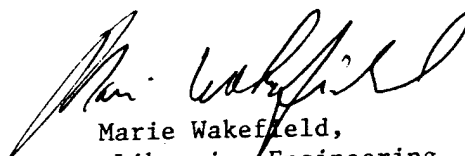
DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

REPLY TO

ATTENTION OF: TR-I Library

17 Sep 1997

Based on SOW, these Energy Studies are unclassified/unlimited.
Distribution A. Approved for public release.


Marie Wakefield,
Librarian Engineering

EXECUTIVE SUMMARY

I. INTRODUCTION

This report presents the final results of the Increment "G" study of the Basewide Energy Systems Plan for Cameron Station in Alexandria, Virginia prepared by Bernard Johnson Incorporated (BJI) under Contract No. DACA 31-81-C-0112. This report also includes results from previous energy studies performed at Cameron Station. The studies are: Increments "A" and "B" of the Basewide Energy Systems Plan, which were performed under the Energy Engineering Analysis Program (EEAP); and those studies performed independent of the EEAP. The combined results from the aforementioned studies indicate that energy use at Cameron Station can be reduced by 22.3 percent in FY85, and 25.8 percent by the Year 2000, as compared to the FY75 energy use baseline.

This report is organized into four sections plus appendices:

- o Section 1. Provides an overview of the scope of the Increment "G" energy study. The section also discusses the results of previous energy studies performed at Cameron Station.
- o Section 2. Provides a description of the Cameron Station facility, techniques used to conduct the Increment "G" energy study, a summary of Cameron Station's energy use and expenditures for the past three (3) years, and an energy use profile for FY81.
- o Section 3. Presents the methodology used to analyze potential energy conservation opportunities under Increment "G" and also discusses projects developed as a result of this analysis.

- Section 4. Discusses Cameron Station's prescribed energy use reduction goals and the effect that identified energy conservation projects will have on goal achievement.

A majority of the information for the Increment "G" study was obtained from data used in the Increment "A" and "B" reports, prepared by the Planning Research Corporation Systems Services Company (PRC/SSC). Additional data were obtained through site visits to the Cameron Station facility and also from input provided by installation personnel.

II. CAMERON STATION'S ENERGY CONSUMPTION

A summary of Cameron Station's fixed facilities energy consumption for FY75 and the past three (3) years is shown in Table 1. This table indicates that the total energy consumption at the installation has steadily decreased through FY80 and increased in FY81. Energy consumption was higher in FY81 compared to FY80 due, in part, to a greater number of heating degree days in FY81. Contributing to the increase in consumption has been the steady increase in electrical consumption since FY79. This results from the extensive use of electrical equipment. The FY81 consumption was 5 percent below the FY75 baseline consumption level.

Figure 1 illustrates the total fixed facilities energy use at Cameron Station by fuel type during FY81. Fuel oil accounted for 20% of the total energy used, while electricity accounted for 76% and natural gas accounted for 4%. As would be expected, peak fuel oil use occurred during the winter months as a result of the demand for building heat. Use of electricity peaked during the summer, reflecting the extensive use of electrically-driven air conditioning equipment.

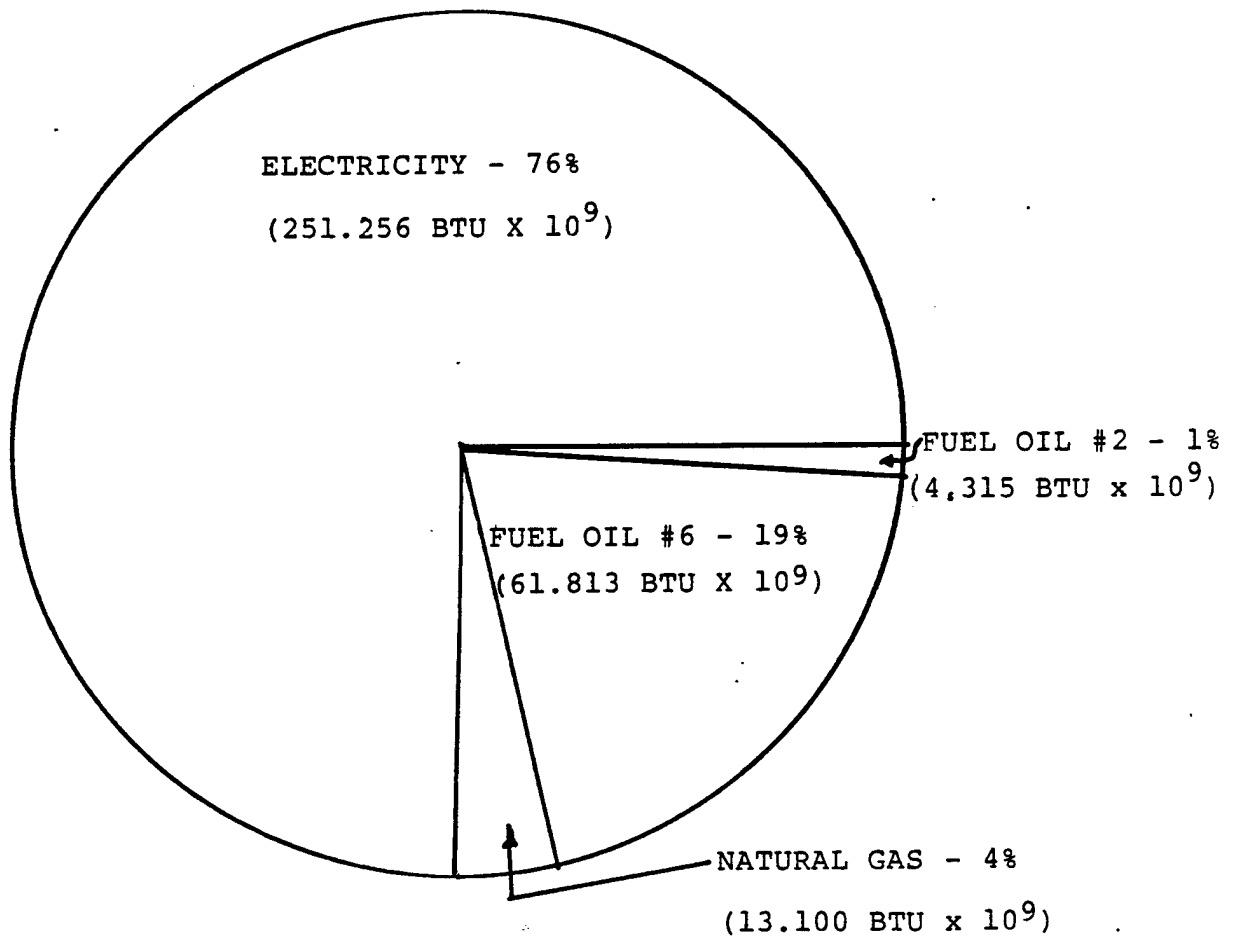
TABLE 1

CAMERON STATION'S FUEL USE — FY75 and FY79 through FY81

FUEL TYPE	FY75 (BTU x 10 ⁹)	FY79 (BTU x 10 ⁹)	FY80 (BTU x 10 ⁹)	FY81 (BTU x 10 ⁹)
Electricity	258.732	240.701	242.938	251.256
Natural Gas	10.655	8.477	5.709	13.100
Fuel Oil #2	4.184	4.131	4.036	4.315
Fuel Oil #6	<u>73.946</u>	<u>68.462</u>	<u>59.040</u>	<u>61.813</u>
TOTALS	347.517	321.771	311.723	330.484

FIGURE 1

TOTAL ENERGY USE IN BUILDINGS BY FUEL TYPE
CAMERON STATION - FY81



TOTAL ENERGY USE AT CAMERON STATION FOR FY81 = 330.484 BTU x 10⁹

Sum-4

III. ENERGY CONSERVATION MEASURES DEVELOPED

The Increment "G" analysis conducted required the investigation of implementing a number of energy conservation measures at Cameron Station. A total of 30 measures were analyzed for possible implementation. Section 3.4 of the report shows all of the measures investigated during this study and the buildings to which they applied. Table 2 shows the projects developed under Increment "G" of the EEAP. Also shown in this Table are the projects developed by PRC/SSC under Increments "A" and "B" of the EEAP, as well as projects developed independent of the EEAP for which data were available. The projects shown in Table 2 are ranked in order of highest E/C ratio. The projects shown can produce an annual energy savings of 73,767 MBtu per year and have a combined Current Working Estimate (CWE) of \$2,157,801.00.

TABLE 2
PRIORITIZED ENERGY CONSERVATION PROJECTS IDENTIFIED AT CAMERON STATION*

PROJECT NO	PROJECT	INCREMENT DEV UNDER	ANNUAL ENERGY SAVINGS (MBtu)	CWE (\$)	B/C RATIO	E/C RATIO
TBD	Install Shower Flow Restrictors	G	3.45	\$ 4.00	57.83	862.50
N/A	Install HVAC System in Building 7	A	45	754.00	N/A	60.10
TBD	Install Pipe Insulation	G	6,981.18	116,648.00	16.91	59.85
FY79-MCA	EMCS	INDEP	49,770	820,000.00	N/A	53.60

N/A: Not Available

* Includes projects developed in Increments "A", "B" and "G" of the EEAP study and those projects developed independent of the EEAP for which energy savings were shown in the PRC report.

TABLE 2
PRIORITIZED ENERGY CONSERVATION PROJECTS IDENTIFIED AT CAMERON STATION*

PROJECT NO	PROJECT	INCREMENT DEV UNDER	ANNUAL ENERGY SAVINGS (MBtu)	CWE (\$)	B/C RATIO	E/C RATIO
MDW-JH002049	Install Window Treatment and Insulation For Temporary Buildings	A	639	\$ 16,616.00	N/A	38.50
MDW-JH002039	Install Window Treatment and Insulation For Permanent Buildings	A	10,083	302,133.00	N/A	33.40

N/A: Not Available

* Includes projects developed in Increments "A", "B" and "G" of the EEAP study and those projects developed independent of the EEAP for which energy savings were shown in the PRC report.

TABLE 2

PRIORITIZED ENERGY CONSERVATION PROJECTS IDENTIFIED AT CAMERON STATION*

PROJECT NO	PROJECT	INCREMENT DEV UNDER	ANNUAL ENERGY SAVINGS (MBtu)	CWE (\$)	B/C RATIO	E/C RATIO
TBD	Install Higher Efficiency Fluorescent Lamps	G				
			Deleted due to review comments from Army Huntsville Division Division (dated 21 Jan 1983)			
TBD	Install Interior Wall Insulation	G	104.57	\$ 11,721.00	1.56	8.92
TBD	Install Ceiling/Roof Insulation	G	5,789.70	741,413.00	1.46	7.81
TBD	Install Infrared Heating	G	351.00	148,512.00	1.13	2.36
Totals			73,766.90	\$2,157,801.00		

N/A: Not Available

* Includes projects developed in Increments "A", "B" and "G" of the EEAP study and those projects developed independent of the EEAP for which energy savings were shown in the PRC report.

IV. ENERGY SAVINGS

The implementation of the energy conservation projects shown in Table 2 can produce a significant savings in Cameron Station's future fixed facilities energy use. Other factors which can significantly affect Cameron Station's future energy use are mission elements and the construction/demolition of facilities. At this time, Cameron Station does not anticipate any major change in mission programs which would significantly affect energy requirements. However, an analysis of the future construction/demolition schedules for the installation showed that by Year 2000, Cameron Station will increase its gross square footage by 7,884 square feet which will result in an estimated annual increase in energy use of 1,198 MBtu. The total energy savings by the Year 2000 resulting from the identified energy conservation projects and construction/demolition are 89,612 MBtu per year.

V. ENERGY USE REDUCTION BY FY85 AND THE YEAR 2000

An analysis of Cameron Station's fixed facilities energy use trends from FY75 through FY81 showed that total energy consumption declined during FY79 and FY80 and then rose during FY81. Energy consumption was higher in FY81 compared to FY80 due, in part, to a greater number of heating days in FY81. Contributing to the increase in consumption has been the steady increase in electrical consumption since FY79. This results from the extensive use of electrical equipment. As can be seen in Table 1, the FY75 fixed facilities energy use was 347,517 MBtu, while in FY81 the energy use was 330,484 MBtu. This difference equates to a 5% decrease in energy use in FY81 as compared to FY75.

Cameron Station's construction/demolition and implementation of energy conservation projects will help reduce the installation's fixed facilities energy consumption. Figure 2 shows the affect that energy conservation projects (developed in Increments "A", "B", "C" and

independent of the EEAP) and construction/demolition will have on Cameron Station's achievement of the FY85 and Year 2000 energy use reduction goals. The figure shows that these factors can provide a 22.3 percent reduction by FY85 and a 25.8 percent reduction by the Year 2000.

FIGURE 2

CAMERON STATION'S PROGRESS TOWARD ENERGY USE REDUCTION GOALS

FISCAL YEAR/ENERGY REDUCTION ACTION	FIXED FACILITIES ENERGY USE	ENERGY REDUCTION (MBtu)	% CHANGE FROM FY75	CUMULATIVE % CHANGE FROM FY75
FY75	347,517	---	---	---
FY81	330,484	17,033	-4.9%	-4.9%
<u>Actions Implemented between FY81 and FY85</u>				
EMCS (Dev. Ind. of EEAP)	N/A	49,770	-14.3%	-19.2%
Proj Dev. Under Increment A	N/A	10,767	-3.1%	-22.3%
Proj Dev. Under Increment G	N/A	3	-0%	-22.3%
Construction/Demolition	N/A	---	---	---
FY85 (Projected)	269,944	77,573	-22.3%	-22.3%
<u>Actions Implemented between FY85 and the Year 2000</u>				
Proj Dev. Under Increment G	N/A	13,227	-3.8%	-26.1%
Construction/Demolition	N/A	-1,198	+0.3%	-25.8%
Year 2000 (Projected)	257,915	89,602	-25.8%	-25.8%